

BENJAMIN E. MEAD

Curriculum Vitae

EDUCATION

Massachusetts Institute of Technology + Harvard Medical School

Health Sciences & Technology

Doctor of Philosophy (Ph.D.) in **Medical Engineering and Medical Physics**

Cambridge, Massachusetts

June 2018

GPA: 4.9/5

Fellowships: NSF Graduate Research Fellowship, HST Fellowship

Research: Tissue engineering, stem cells, high throughput biotechnologies, mucosal immunity, gastrointestinal disease

Advisors: Profs. Jeffrey Karp & Robert Langer | **Key collaborators:** Profs. James Collins, Alex Shalek, Richard Blumberg

Coursework: Harvard Medical School, MIT Chemical & Biological Engineering, MIT Sloan School of Management

University of Colorado Boulder

College of Engineering & Applied Science

Summa Cum Laude, Bachelor of Science (B.S.) in **Chemical and Biological Engineering** GPA: 3.9/4 Class Rank: 1 of 84

Boulder, Colorado

May 2013

Concentration: Tissue Engineering & Pre-Medicine | **Minor:** Biochemistry

Scholarships: NIST PREP Fellow, HHMI UROP, CU merit award

RESEARCH, PROJECT, LEADERSHIP EXPERIENCE

MIT-GSK G.B. Elion Postdoctoral Fellow | Shalek Lab, MIT, Broad Inst., Ragon Inst.

Cambridge, Massachusetts

August 2018-Present | *The Shalek Lab develops technologies to understand how cells perform systems-level functions in health and disease.*

- Industry-sponsored postdoctoral fellows developing of next-generation approaches for drug discovery
- Advancing novel approaches and platform technologies for the rational design of 'high fidelity' cellular models for drug development, with specific focus on organoid-based systems in the gastrointestinal tract
- Integrating massively parallel single-cell RNA sequencing, high throughput drug screening, and biomaterials approaches

Scientist I & Consultant | Frequency Therapeutics, Inc.

Woburn, Massachusetts

July 2017-August 2018 | *Frequency Therapeutics is a clinic-stage biotechnology startup, focused on developing small molecules for adult progenitor cell activation for regeneration.*

- Worked with CSO & CMO to identify opportunities in multiple disease areas based on available expertise and IP, and acted to secure funding from external sources to support preclinical program
- Executed pilot research program for beta-cell replacement in diabetes (cell therapy) and managed industry-academic collaboration to meet project milestones, including managing BL2 lab

Graduate Research Assistant | Karp Lab, Brigham and Women's Hospital, HMS & Langer Lab, Koch Institute for Integrative Cancer Research, MIT

Boston-Cambridge, Massachusetts

January 2014-June 2018 | *The Langer and Karp Labs develop advanced biomaterials, methodologies, and devices for therapeutic application via highly multidisciplinary approaches.*

- Secured and managed private foundation grants, supervised the full-time research activities of 8 interns and technicians and coordinated collaborations with multiple groups including Jim Collins, Alex Shalek, Rick Blumberg, and others
- Developed high throughput tools and engineered intestinal organoid systems to probe host-microbe interaction, for application in inflammatory bowel disease, metabolic disease, and infection
- Well-versed in core molecular biology, genomics, nanotechnology, and data analysis techniques including mass spec. proteomics, biochemical assays, confocal microscopy, flow cytometry, single cell RNA-seq, 16S rDNA-seq, and high throughput screening

Intern | Flagship VentureLabs, Flagship Pioneering

Cambridge, Massachusetts

September-December 2016 | *The VentureLabs seek to generate breakthrough technologies and first-in-class ventures to solve challenges, disrupt markets, and shape a better future.*

- Defined and de-risked new ventures in healthcare and biotechnology with a team of associates and senior associates
- Identified and advanced priorities for R&D in early-stage company, currently in rapid-growth and pre-clinical development

Board Member & Special Events Chair | MIT Microbiome Club, MIT Microbiome Center

Cambridge, Massachusetts

September 2015-September 2017 | *The MIT microbiome club is a student-led group dedicated to the exploration of the field, bringing together the students, researchers, and clinicians.*

- Founding board member and chair of special events committee, charged with 5-10 direct reports and a \$20k annual budget for developing and hosting large annual special events for greater MIT/Boston microbiome community

- Organized inaugural and second symposium, bringing together 250+ students, investigators, and companies interested in translational opportunities in the human microbiome

Research Intern | Breault Lab, Children's Hospital Boston, HSCI & HMS **Boston, Massachusetts**
June 2012-September 2012 | The primary goal of the HSCI is to move basic biological discoveries from the lab bench to new treatments, whether stem cell-based or stem cell-derived.

- Sought to understand role of aging on mesenchymal stem cell function in transgenic murine models, including investigation of telomerase complexes in bone as a function of age, resulting in manuscript under peer review

HHMI Undergraduate Researcher | Bryant Lab, CU Boulder **Boulder, Colorado**
May 2011-July 2013 | The Bryant Lab designs hydrogel biomaterials employed as cell scaffolds to guide functional tissue growth and integration for regenerative medicine.

- HHMI grant recipient for research on effects of osmolarity on cartilage tissue production, resulting in peer reviewed publication
- Undergraduate senior thesis on the effects of WNT signaling pathways on tissue regeneration in primary chondrocytes grown in synthetic custom-designed hydrogel scaffolds

PREP Fellow | National Institute of Standards & Technology **Boulder, Colorado**
May 2010-June 2013 | The Thermodynamics Research Center evaluates thermophysical data of chemical compounds and develops large thermophysical property databases.

- Lead on multiple data review projects that required computationally modeling & verifying thermodynamic data, and evaluating associated uncertainties; served as a manuscript reviewer for peer-reviewed publications in the field, built data management systems

AWARDS & HONORS

2017	Kenneth Rainin Foundation Scientific Grant Award Reviewer
2017	F1000 Associate Faculty Member
2016	Cell Stem Cell Best of 2016 – Top Review Article
2015	Kenneth Rainin Foundation Innovations Symposium Best Poster Prizes <i>An <i>in vitro</i> Paneth cell platform to probe dysbiosis in IBD</i> <i>Towards gut epithelial repair: vitamin D's role in intestinal stem cell differentiation</i>
2015-2018	National Science Foundation Graduate Research Fellow
2014	Hertz Foundation Fellowship Finalist
2014	National Science Foundation Graduate Research Fellowship Program Honorable Mention
2013	Colorado Engineering Council Certificate of Merit
2013	Outstanding Graduate for Research College of Engineering & Applied Science
2013	Distinguished Senior in Chemical & Biological Engineering
2013	Outstanding Senior Award
2013	Active Learning Award
2012	Kazuko Boe Outstanding Junior Award
2011	Donald F. Othmer Sophomore Academic Excellence Award
2009-2013	Dean's List of the College of Engineering & Applied Science (8 semesters)

PUBLICATIONS

- Chitnis GD, Verma MKS*, Lamazouade J*, Jones PA, **Mead BE**, Cruzat A, Tong Z, Martyn K, Aniruddh Solanki A, Landon-Brace N, Karp JM, **An Intelligent Injector for Tissue Targeting and its Application for Ocular Drug Delivery, Nature Biomedical Eng. (2018) IN PRESS**
- Ng KS*, Smith JA*, McAteer MP*, **Mead BE**, Ware J, Jackson FO, Ferreira L, Bure K, Rowley JA, Reeve B, Brindley DA, Karp JM, **Bioprocess Decision Support Tool For Scalable Manufacture of Extracellular Vesicles, Biotechnology and Bioengineering (2018), doi: 10.1002/bit.26809**
- **Mead BE***, Ordovas-Montanes J*, Braun AP, Levy LE, Bhargava P, Szucs MJ, Ammendolia DA, MacMullan MA, Yin X, Hughes TK, Wadsworth II MH, Ahmad R, Rakoff-Nahoum S, Carr SA, Langer R, Collins JJ, Shalek AK, Karp JM, **Harnessing single-cell genomics to improve the physiological fidelity of organoid-derived cell types, BMC Biology (2018), doi: 10.1186/s12915-018-0527-2**

- Tong Z, Martyn K, Yang A, Yin X, **Mead BE**, Joshi N, Sherman NE, Langer RS, Karp JM, **Towards a defined ECM and small molecule based monolayer culture system for the expansion of mouse and human intestinal stem cells**, *Biomaterials* (2018), doi: 10.1016/j.biomaterials.2017.10.038
- Holmberg FEO, Seidelin JB, Yin X, **Mead BE**, Tong Z, Li Y, Karp JM, Nielsen OH, **Culturing human intestinal stem cells for regenerative applications in the treatment of IBD**, *EMBO Mol. Med.* (2017), doi: 10.15252/emmm.201607260
- Yin X, **Mead BE**, Safaei H, Langer R, Karp JM, Levy O, **Engineering Stem Cell Organoids**, *Cell Stem Cell* (2016), doi: 10.1016/j.stem.2015.12.005 COVER FEATURE, CELL STEM CELL BEST OF 2016
- Smith JA*, Ng KS*, **Mead BE**, Dopson S, Reeve B, Edwards J, Wood MJA, Carr AJ, Bure K, Karp JM, Brindley DA., **Extracellular vesicles: commercial potential as byproducts of cell manufacturing for research and therapeutic use**, *Bioprocess International* (2015), 13(4) s:20,22,24-27,48.
- Silva M, Daheron L, Hurley H, Bure K, Barker R, Carr AJ, Williams D, Kim HW, French A, Coffey PJ, Cooper-White JJ, Reeve B, Rao M, Snyder EY, Ng KS, **Mead BE**, Smith JA, Karp JM, Brindley DA, Wall I, **Generating iPSCs: Translating Cell Reprogramming Science into Scalable and Robust Biomanufacturing Strategies**, *Cell Stem Cell* (2015), doi: 10.1016/j.stem.2014.12.013
- Farnsworth NL, **Mead BE**, Antunez LR, Palmer AE, Bryant SJ, **Ionic osmolytes and intracellular calcium regulate tissue production in chondrocytes cultured in a 3D charged hydrogel**, *Matrix Biology* (2014), doi: 10.1016/j.matbio.2014.08.002

SELECT PRESENTATIONS

- **Mead BE**, Levy I, Ordovas-Montanes J, Braun AP, Zheng Y, Ammendolia DA, Bhargava P, Yin X, Hughes T, Wadsworth M, Langer R, Shalek A, Collins JJ, Karp JM, ***In vitro* Paneth-like cells enable investigation of intestinal secretory cell development and function**, *Kenneth Rainin Foundation Innovations Symposium* (2017)
- **Mead BE**, Levy I, Ordovas-Montanes J, Braun AP, Zheng Y, Ammendolia DA, Bhargava P, Yin X, Hughes T, Wadsworth M, Langer R, Shalek A, Collins JJ, Karp JM, **Building a Paneth Cell: exploring cellular origin and function to inform host-microbe interaction**, *MIT Microbiome Center Symposium* (2016)
- **Mead BE**, Karp JM, **Building a Paneth Cell: exploring cellular origin and function to inform IBD**, *Kenneth Rainin Foundation Innovations Symposium* (2016) Invited Talk
- **Mead BE**, Ammendolia DA, Braun AP, Yin X, Bhargava P, Collins JJ, Langer R, Karp JM, **An *in vitro* Paneth cell platform to probe dysbiosis in IBD**, *Kenneth Rainin Foundation Innovations Symposium* (2015)
- **Mead BE***, Lu L*, Braun AP, Yin X, Langer R, Snapper S, Karp JM, **Towards gut epithelial repair: vitamin D's role in intestinal stem cell differentiation**, *Kenneth Rainin Foundation Innovations Symposium* (2015)
- **Mead BE**, Bryant SJ, **An investigation of WNT Signaling pathways and regenerative potential in Mature Cartilage Cells for Joint Tissue Engineering applications**, *Undergraduate Thesis Defense* (2013)
- **Mead BE**, Carlone D, Breault D, **Characterization & Age-Dependent Study of mTert⁺ Marrow Cells**, *HSCI Internship Symposium* (2012), Accepted to AICbE Student Conference (2012)
- **Mead BE**, Farnsworth NL, Bryant SJ, **Effects of Osmolarity on Chondrocyte Tissue Production in Hydrogel Scaffolds**, *HHMI UROP Symposium* (2012)

ACTIVE & COMPLETED SUPPORT

- **2018-2020 MIT-GSK Gertrude B. Elion Postdoctoral Fellowship**, \$300,000, postdoctoral fellow, PI: Alex Shalek
MIT Institute for Medical Engineering & Science & GlaxoSmithKline: August 2018 - July 2020
“Advancing Scalable Systems to Mine the Gut Host-Microbe Interface for Therapeutic Discovery”
- **2015-17 Breakthrough Award**, \$200,000, proposal author & graduate researcher, PI: Jeffrey Karp
Kenneth Rainin Foundation: October 2015 - November 2017
“Dysbiotic Intervention: Harnessing Intrinsic Human Defenses Via The Paneth Cell Secretome To Engineer The Microbiome”
- **2014 Innovator Award**, \$100,000, proposal author & graduate researcher, PI: Jeffrey Karp

Kenneth Rainin Foundation: October 2014 - November 2015

"Dysbiotic Intervention: Harnessing Intrinsic Human Defenses Via The Paneth Cell Secretome To Engineer The Microbiome"

- **2014 Research Day "Shark Tank", \$50,000, proposal author & graduate researcher, PI: Jeffrey Karp
Brigham & Women's Hospital: June 2014 - June 2015**
"Changing the Landscape of Inflammatory Bowel Disease Through Controlling Gut Bacteria"
- **2012 UROP, \$2,400, proposal author & undergraduate researcher, PI: Stephanie Bryant
Howard Hughes Medical Institute: October 2011 - May 2012**
"The Role of Physiological Osmolarity in Chondrocyte Tissue Production"

MENTORSHIP

- **Daphne Sze**, B.S. 2019 University of Toronto, Karp Lab Undergraduate Researcher *May 2017-May 2018*
- **De Hua Yang**, B.S. 2018 University of Toronto, Karp Lab Undergraduate Researcher *June 2016-May 2017*
- **Lauren Levy**, B.S. 2016 Brown University, Karp Lab Project Scientist *July 2016-June 2018*
- **Matthew McAteer**, B.S. 2016 Brown University, Karp Lab Researcher *May-October 2016*
- **Yixin Zheng**, B.S. 2018 University of Toronto, Karp Lab Undergraduate Researcher *October 2015-September 2016*
- **Dustin Ammendolia**, B.S. 2016 University of Waterloo, Karp Lab Undergraduate Researcher *January-September 2015*
- **Kiley Hartigan**, B.S. 2018 University of Colorado Boulder, Dept. of Chem. & Bio. Eng. ASMP *November 2014-December 2016*
- **Alexandra Braun**, M.Eng. 2014, B.S. 2013 Cornell University, Karp Lab Project Scientist *November 2014-May 2016*
- **Travis van de Veer**, B.S. 2016 University of Colorado Boulder, Dept. of Chem. & Bio. Eng. ASMP *October 2014-May 2015*
- **James A. Smith**, B.S. 2014 Oxford University, SENS Summer Scholar *July-November 2014*

COMMITTEES – AFFILIATIONS – COMMUNITY SERVICE

- 2018-Present: Reviewer for Nature Nanotechnology
- 2017-Present: Kenneth Rainin Foundation Scientific Grant Award Reviewer
- 2017-Present: F1000 Associate Faculty Member
- 2014-Present: Broad Institute of Harvard & MIT – Affiliate
- 2013-Present: University of Colorado Boulder, College of Engineering & Applied Science GOLD board member
- 2013-Present: Koch Institute of Integrative Cancer Research of MIT - Affiliate
- 2015-2018: MIT Microbiome club board member & special events chair
 - Organized and hosted MIT-Harvard microbiome symposium, half-day event with 200+ attendees
- 2015-2017: Boston Marathon: medical team volunteer, finish line sweep team
- 2014-2016: University of Colorado Boulder, Dept. of Chem. & Bio. Eng. alumni student mentor
- 2014-2017: Karp Lab student outreach speaker (for BLI, Japanese exchange, & elementary students)
 - Interact and direct the college outreach to young alumni and foster relationships with soon to be graduates
- 2014: Boulder Boulder volunteer
- 2013-2014: HST Service: Physiology Phun Day
- 2012-2018: Harvard Stem Cell Institute - Affiliate